

“No-Cost” AO

AO Simplification Idea: Omit proposed costs from select Step 1 AOs to allow greater focus on definition of the technical and management implementation baseline plan

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Lessons Learned Workshop**

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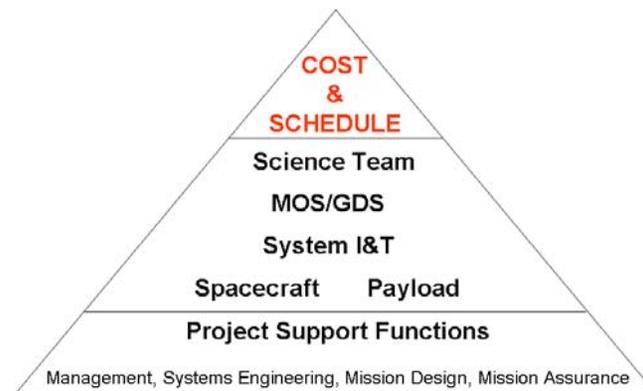


What does AO Simplification mean?

AO Simplification = Simplify AO Requirements

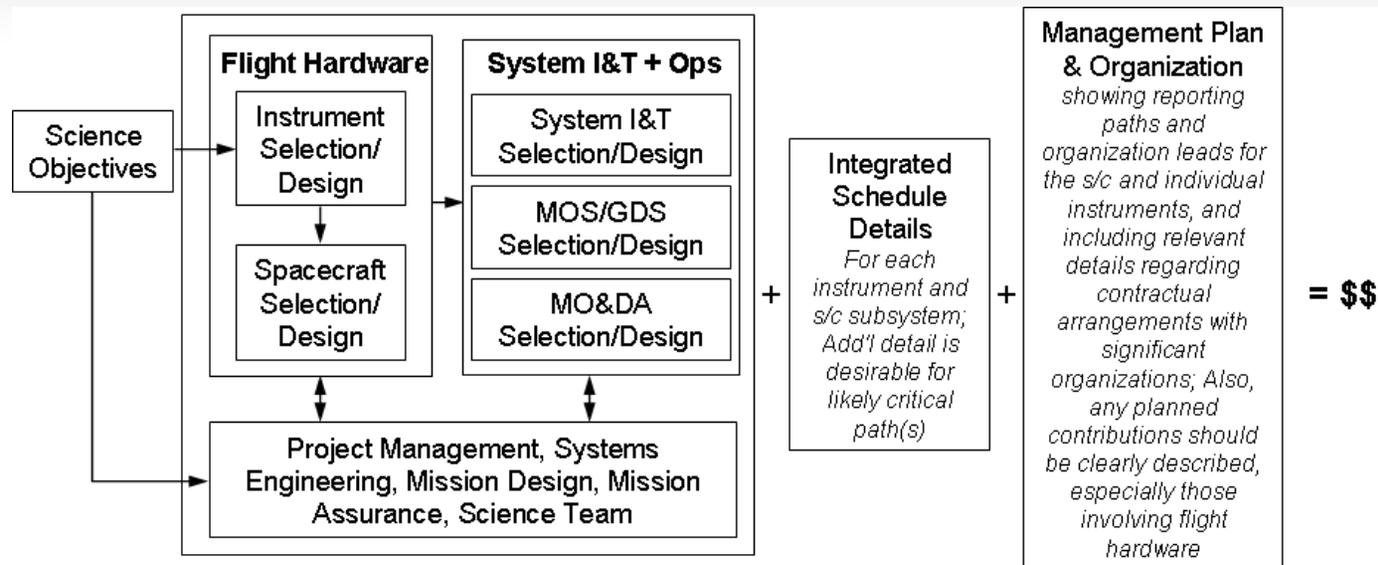
≠ Reduce Concept Definition Requirements

- Emphasis on better cost performance requires a more thorough definition of the baseline design and implementation plan to support cost estimates and assessments (not more cost reserves)
- The foundation for a good cost estimate requires mature and feasible technical and management plans to meet concept requirements



- If AO requirements are reduced/simplified, it is even more important to require evidence of any available more detailed analyses supporting resource estimates (technical, schedule, and cost)

Cost Elements and Inter-relationships



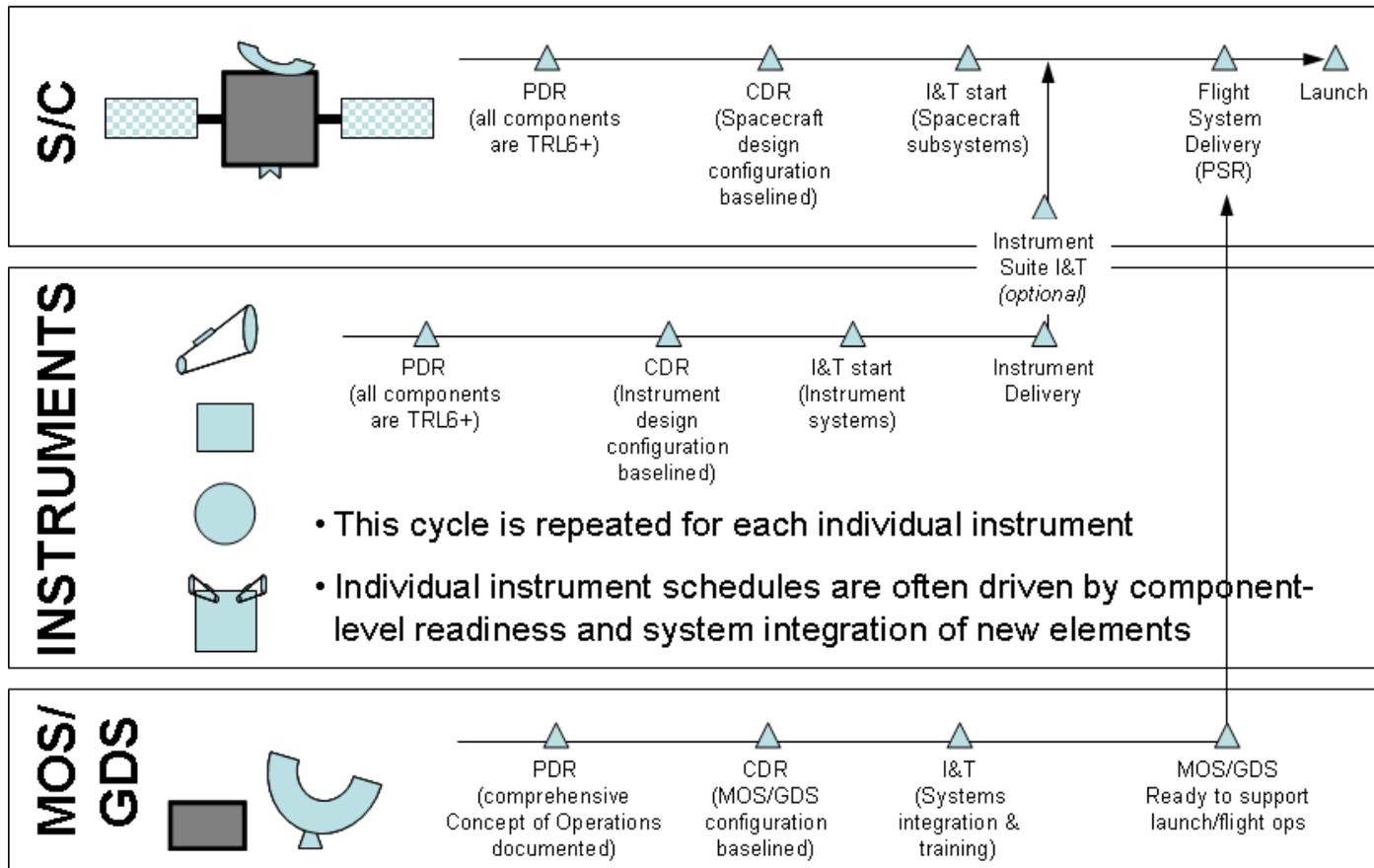
- Science Objectives drive the entire implementation plan
- Cost is entirely dependent on the technical and management approach
- Omitting technical/management definition details to simplify the process could seriously compromise independent cost assessments
- Cost information is useful for validating the proposed estimates and to develop comparisons to independent estimates; however, independent estimates can be reasonably developed without cost information **but not without good technical and management definition**

Importance of S/C Subsystem & Instrument MELs

- Understanding of flight hardware at the component-level improves accuracy of technical, schedule, and cost resource requirement estimates
- Heritage credits at the subsystem-level are easier to assess with good definition of component-level maturity
- Advanced technology development needs are easier to assess with good definition of component-level maturity
- Ability to move from concept to real development sooner due to better flight system definition
- Regarding instruments, heritage is not common at the instrument-level, so component-level understanding greatly helps assess instrument resource requirements
- Understanding of flight hardware component-level requirements facilitates establishment of a technical design baseline, which is needed as early in the process as possible to control costs

Development Cycles for Major Items Drive Schedule

- Schedule development is a complex integration of multiple lower-level element cycles, typically with multiple potential critical paths – Activity phasing drives the required funding profile and impacts schedule risk (which affects cost)



Significant Management/Organizational Cost Drivers

- Past experience for lead project management organization
- Past experience for spacecraft, instrument, and MOS/GDS developers
- Mission, flight, and ground system complexity
- Contractual arrangements with key partners (w/ contract type and specification of burdens and fees)
- International partner roles and ITAR requirements
- EEE parts quality requirements
- Test facility availability
- Other organization-specific conflicts (like with other projects)
- Project risk classification and risk mitigation plans

Simplification Idea: Omit Proposed Costs for Step 1 AOs

- **To simplify the proposal writing and evaluation process, a Step 1 AO could require proposers to NOT submit any cost information**
 - AO would have to include better requirements for definition of technical, schedule, and management baseline plans
 - Better definition of concept technical and implementation baseline would support more accurate independent cost estimates/assessments
- **Proposers would still need to ensure their concept's scope is within a specified AO cost cap**
 - This requires cost estimation support for concept definition, but relieves burden of generating detailed cost tables
 - Schedules would still be required and would need to show critical paths and margins
 - This also relieves proposers of the requirement to present a rationale for cost reserves and perform probabilistic analyses (s-curves)
- **The idea would not be applicable to:**
 - Selections made in one-step process (versus AOs with a downselect)
 - AOs with large cost caps expecting a significant number of candidates to be well below the cap

Pros & Cons of Omitting Proposed Costs for Step 1 AOs

	Proposal Community	Independent Evaluators
<i>Pros</i>	<ul style="list-style-type: none"> • No detailed cost tables • No cost reserve rationale or s-curves • No costing methodology descriptions • Allows more attention for definition of technical and management baselines 	<ul style="list-style-type: none"> • Better definition of technical and management baselines to support independent costing • No assessments of proposed costs/reserves • Comparable treatment of all proposals relative to their scope and risk versus AO cost cap
<i>Cons</i>	<ul style="list-style-type: none"> • May need to plan scope more conservatively to allow for cost estimating uncertainty • Still requires costing support to ensure scope is within AO cost constraints 	<ul style="list-style-type: none"> • Cannot assess proposed basis of estimate for cost (although many BoE issues relate to technical/management definition) • Puts more emphasis on independent costing processes and interpretation of results

Summary

- Many ideas for simplifying the AO process complicate performing an accurate independent cost assessment
- Since technical and management baseline plans drive cost, more cost details with less technical and management definition will make independent validation more difficult
- Since most proposals for AOs with relatively low cost caps are near the cap, an assessment of whether technical and management plans could be supported by available funding needs good technical and management (schedule) definition far more than details regarding the proposed costs and breakdowns
- In general, AO simplification needs to be carefully implemented to not conflict with the desire for better cost performance

Backup

Common Issues with Costing Basis of Estimates

Design Credibility (*affects instruments more often than spacecraft*)

- MELs – do not readily correlate with block diagrams and descriptions
- Heritage Applicability – insufficient design information to validate

Schedule Feasibility

- Complex integration of numerous potential critical paths often oversimplified
- Individual element details from start to System I&T delivery often missing

Cost Realism (= *Design Credibility + Schedule Feasibility + Basis of Estimate*)

- Source of heritage not well defined and degree of anticipated savings overstated
- Cultural/organizational/programmatic cost impacts not explained
- WBS incomplete and does not correlate to hardware elements and schedule

Internal Cost Validations

- Too much comfort with comparable bottom-lines
- Lower-level differences are to be expected
- Better to describe understanding of reason for differences versus rationalizing

Accuracy Requirements

- Cost Models are typically quoted as +/- 20%
- Proposed costs have to be as close to +0% as possible
- Actual costs typically +20% higher than Phase A estimates (w/ reserves)

Higher Cost Reserves = Better Cost Performance??

NO!!

- Recent attempts to improve cost performance rely on higher reserve level requirements, although past history shows cost reserves typically do not offset issues with early estimates

